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Description

The invention relates to a compressor comprising a hermetically sealed housing which accommodates a motor-compressor unit having an inlet opening with a connecting piece, the housing having a wall with an inlet opening which is provided with a connecting piece, said connecting pieces being interconnected by a hollow flexible suction duct which allows leakage of gas and oil.

Such a compressor is known from EP—A—73 469. For several decades compressors with hermetically sealed housings have been manufactured in which the suction pipe which extends from the evaporator terminates inside the housing. The motor-compressor unit draws the evaporated refrigerant from the space inside the housing. It is also known that an improved efficiency can be obtained by leading the suction pipe through the housing wall and connecting it directly to the inlet of the motor-compressor unit. This direct suction reduces the compression temperature, which reduces the likelihood of entrained oil being burnt. One of the requirements imposed on such a connection between the housing wall and the unit is that the pipe should "leak". Without this the pressure in the hermetically sealed housing may become lower (when refrigerant is absorbed in the oil) or higher than the pressure in the closed evaporator-compressor circuit. A higher pressure in the housing should be avoided, because this may result in additional noise being produced in the bearings.

In EP—A—73469 an arrangement for the direct suction comprises a flexible suction duct in the form of a closely coiled cylindrical coil spring element. Such an element does readily transmit contact noises and is "leaky" enough to provide pressure equalization but not so leaky that the relatively cold refrigerant can flow from the suction pipe to the warmer space inside the housing and back, in which case the gas which returns is relatively warm.

It is the object of the invention to provide a further improvement of the efficiency of such a direct-suction compressor.

To this end the invention is characterized in that the suction element is surrounded with an insulating jacket which is spaced from the suction element, which also allows leakage of gas and oil and which is secured to at least one of the connecting pieces so that a movement of the connecting pieces relative to each other is substantially not obstructed. The insulating jacket inhibits the exchange of gas in the suction element with gas in the space inside the housing, so that the incoming gas is warmed to a minimal extent. Moreover, the jacket damps gas pulsations in the gasflowing towards the space inside the compressor housing.

An embodiment of the compressor is characterized in that one end of the jacket is secured to one of the connecting pieces and the other end is directed downwards and is clear of the suction element and communicates with the space inside the compressor housing.

The jacket should surround the suction element at a distance therefrom such that the jacket cannot contact the suction element when the unit starts the stops. The jacket should be open at the bottom and in order to allow excess oil to drip back into the compressor housing.

Another embodiment of the compressor is characterized in that the jacket is made of a flexible porous material. An example of this is a braided metal or plastic sleeve.

An embodiment of the invention will now be described in more detail, by way of example, with reference to the accompanying drawing, in which

Figure 1 is a schematic sectional side elevation of a compressor, and

Figure 2 shows a coil spring element forming the flexible suction pipe in the compressor shown in Figure 1, with the surrounding jacket.

The compressor comprises a hermetically sealed housing 1 in which a motor-compressor unit 2 is suspended by means of springs 3. The unit comprises an electric motor 4 and a suction pump 5. The electric motor drives a piston 7 by means of a connecting rod 6. The evaporated refrigerant is drawn into the pump *via* a suction pipe 8 combined with mufflers in a connecting piece 14, is compressed by the pump and is pumped into the refrigerating system, not shown, *via* a pressure pipe 9. An oil bath 10 is situated in the lower part of the housing. The wall of the housing has a passage 11 provided with a connecting piece 12. The suction pump of the motor-compressor unit 2 has an inlet opening 13 with the connecting piece 14. The suction pipe 8 extends between the two connecting pieces 12, 14. The suction pipe is flexible, having the form of a cylindrical coil spring element 15 with closely coiled turns 16. In one embodiment in insulating jacket 19 is rigidly connected to the connecting piece 14. The jacket is clear of the coil spring element 15. Preferably, the inner diameter of the jacket is 3 to 5 mm larger than the outer diameter of the coil spring element. Satisfactory results have been obtained with a coil spring element whose thickness is 0.8—1.0 mm, whose turns have a width of approximately 20 mm, whose length is approximately 50 mm and which has a pitch between the turns of 0.05—0.15 mm. Such a coil spring element allows movements of the motor-compressor unit relative to the housing and does not readily transmit acoustic vibrations, and, due to the narrow gaps between the turns, the suction pipe allows some leakage of gas and oil. The jacket provides a thermal insulation and damps gas pulsations in the gas towards the space indice the compressor housing.

The refrigerating system connected to the compressor always contains some oil carried from the compressor housing. In the coil spring element this oil settles between the turns and thus also provides some sealing for refrigerant vapour. An additional advantage of this is that when the unit is started and stopped oil is flung off by vibrations

of the coil spring element, which may have a substantial amplitude. Thus, excess oil is discharged into the jacket and reaches the space inside the housing *via* the lower end of the jacket. Therefore, an oil separator is not needed. This construction also prevents oil splashes in the compressor housing from reaching the gaps between the turns of the coil spring element.

In order to allow for comparatively large displacements between the compressor unit and the housing it is favourable if the ends 17, 18 of the coil spring element or sleeve can be slid onto the connecting pieces 12, 14 over some distance. Preferably, the connecting pieces 12, 14 are made of a poor thermal conductor. This results in a further reduction of the heat transfer to the coil spring element and hence to the refrigerant.

Instead of the coil spring element a flexible sleeve, for example, a braided sleeve, of a specific strength may be used for the suction pipe. The interstices in the braided sleeve should not be too large. Such a sleeve also meets the requirements and has the same advantages as a coil spring element.

The jacket may alternatively be a sleeve made of a flexible and porous material. This sleeve may surround the entire suction pipe with clearance, its ends being secured to the respective connecting pieces. A flexible sleeve follows the movements of the unit relative to the housing in the same way as the flexible suction pipe. However it is then required to give the interstices in the sleeve the correct dimensions.

Claims

1. A compressor comprising a hermetically sealed housing (1) which accommodates a motor-compressor unit (2) having an inlet opening (13) with a connecting piece (14), the housing having a wall with an inlet opening (11) which is provided with a connecting piece (12), said connecting pieces being interconnected by a hollow flexible suction duct (15) which allows leakage of gas and oil, characterized in that the suction duct (15) is surrounded with an insulating jacket (19) which is spaced from the suction element, which also allows leakage of gas and oil and which is secured to at least one of the connecting pieces (12, 14) so that a movement of the connecting pieces relative to each other is substantially not obstructed.

2. A compressor as claimed in Claim 1, characterized in that one end of the jacket (19) is secured to one of the connecting pieces and the other end is directed downwards and is clear of the suction duct (15) and communicates with the space inside the compressor housing (1).

3. A compressor as claimed in Claim 1, characterized in that the jacket (19) is made of a flexible and porous material.

Patentansprüche

1. Verdichter mit einem luftdicht verschlossenen Gehäuse (1), in dem eine Motorverdichtereinheit (2) untergebracht ist, die eine Eingangsöffnung (13) mit einem Verbindungsteil (14) aufweist, wobei das Gehäuse eine Wand mit einer Eingangsöffnung (11) aufweist, die mit einem Verbindungsteil (12) versehen ist, wobei die Verbindungsteile durch eine biegsame hohle Saugleitung (15) miteinander verbunden sind, wobei diese Leitung ein Weglecken von Gas und Öl ermöglicht, dadurch gekennzeichnet, dass die Saugleitung (15) von einem in einem Abstand von der Saugleitung liegenden Isoliermantel (19) umgeben ist, der ebenfalls ein Weglecken von Gas und Öl ermöglicht und der an wenigstens einem der Verbindungsteile (12, 14) derart befestigt ist, dass eine Bewegung der Verbindungsteile gegenüber einander im wesentlichen nicht gehemmt wird.

2. Verdichter nach Anspruch 1, dadurch gekennzeichnet, dass ein Ende des Mantels (19) an einem der Verbindungsteile befestigt ist und das andere Ende abwärts gerichtet und frei von der Saugleitung (15) liegt und mit dem Innenraum des Verdichtergehäuses (11) in Verbindung steht.

3. Verdichter nach Anspruch 1, dadurch gekennzeichnet, dass der Mantel (19) aus einem biegsamen und porösen Werkstoff hergestellt ist.

Revendications

1. Compresseur comportant un boîtier fermé de façon étanche (1) et dans lequel est placée une unité de moteur-compresseur (2) présentant un orifice d'admission (13) muni d'une pièce de raccordement (14), le boîtier ayant une paroi présentant une ouverture d'entrée (11) munie d'une pièce de raccordement (12), lesdites pièces de raccordement étant liées entre elles par une conduite d'aspiration flexible creuse (15) permettant l'échappement de gaz et d'huile, caractérisé en ce que la conduite d'aspiration (15) est entourée d'une enveloppe isolante (19) séparée par une certaine distance de la conduite d'aspiration, enveloppe qui permet également un échappement de gaz et d'huile et qui est fixée à au moins l'une des pièces de raccordement (12, 14), de telle manière que des mouvements relatifs des pièces de raccordement ne sont pratiquement pas entravés.

2. Compresseur selon la revendication 1, caractérisé en ce que l'une des extrémités de l'enveloppe (19) est fixée à l'une des pièces de raccordement et l'autre extrémité est dirigée vers le bas, est dégagée de la conduite d'aspiration (15) et communique avec l'espace à l'intérieur du boîtier (1) du compresseur.

3. Compresseur selon la revendication 1, caractérisé en ce que l'enveloppe (19) est en matériau flexible et poreux.

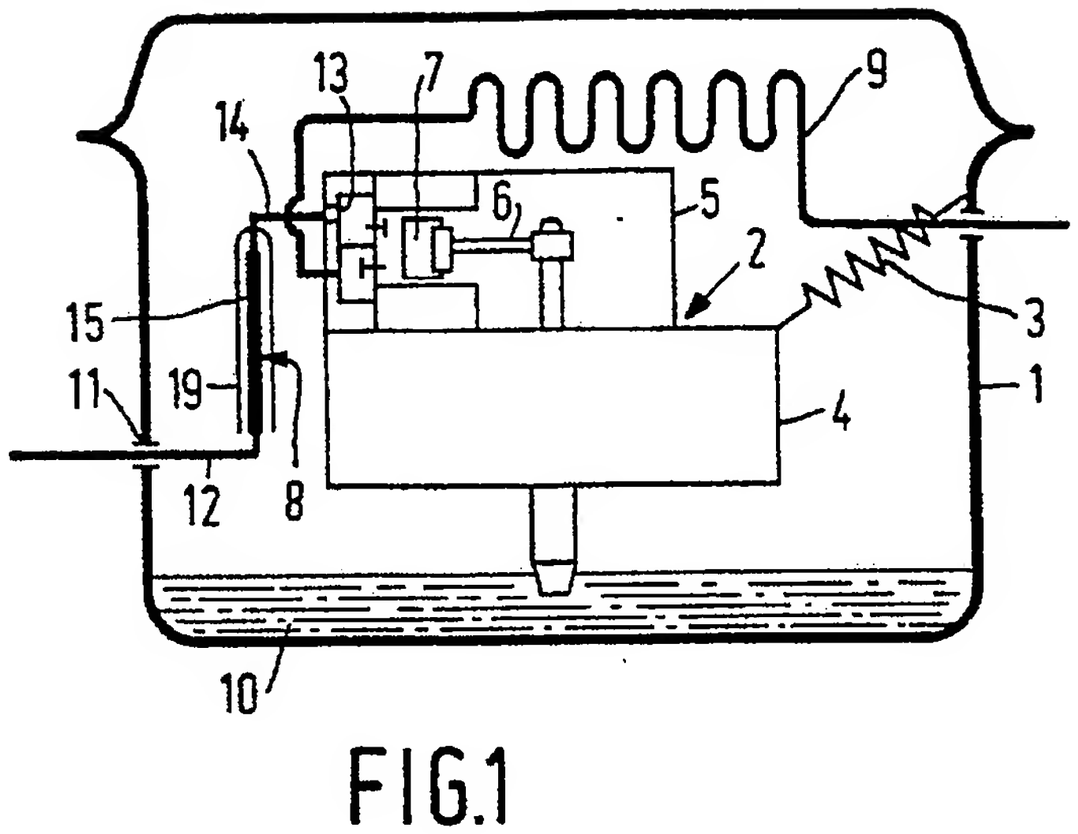

FIG.1

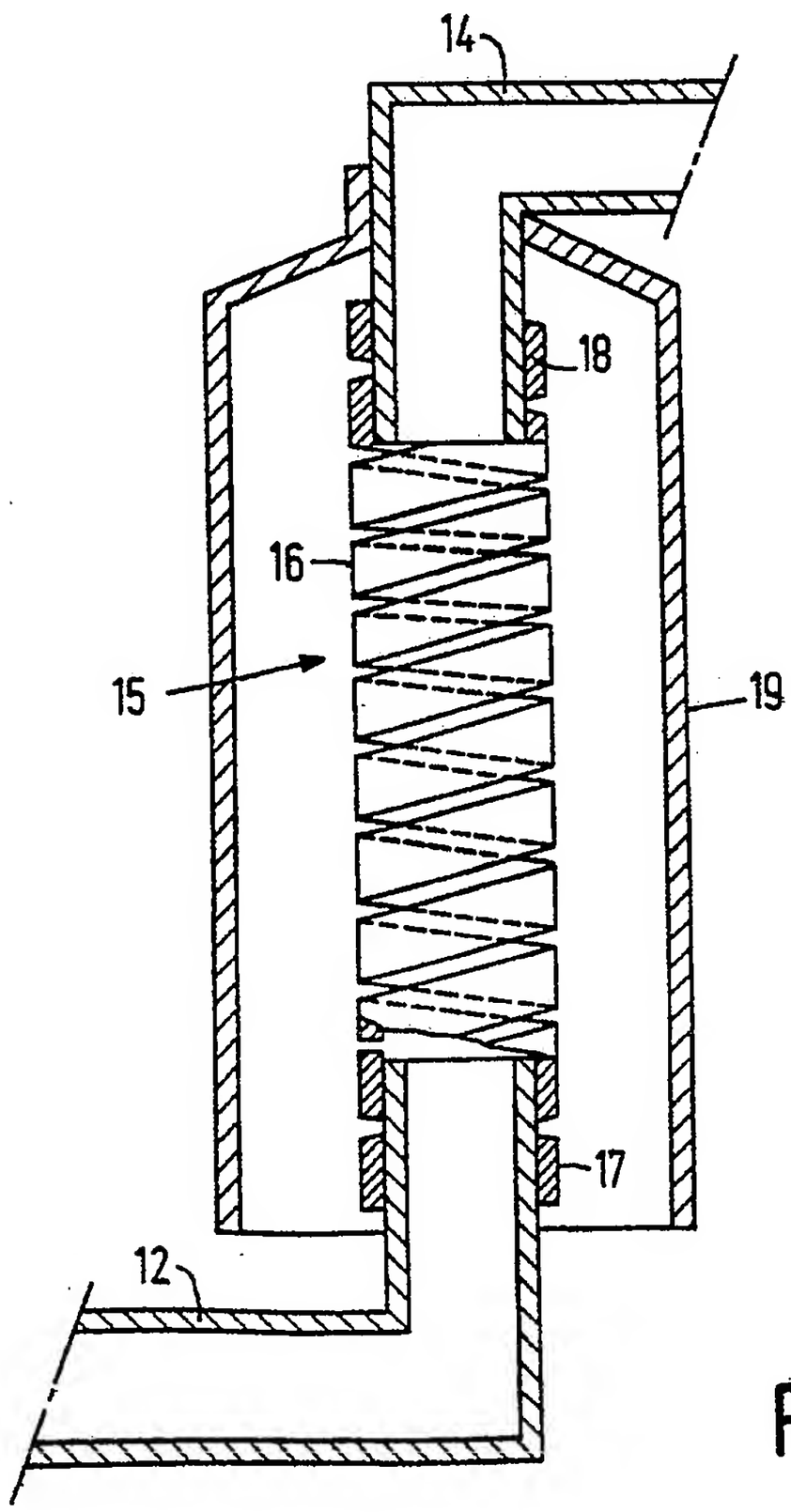

FIG.2